WHAT IS CLAIMED IS:

1. A radiotherapy method comprising irradiating a treatment volume containing a high atomic number contrast medium with a photon beam having an energy spectrum characterized by a maximum photon energy in excess of 1 MeV, and a mean photon energy in excess of 250 keV.

2. A radiotherapy method according to claim 1 wherein the mean photon energy is in excess of 1 MeV.

3. A radiotherapy method according to claim 1 wherein the energy spectrum is characterized by a maximum fluence at an energy in excess of 200 keV.

4. A radiotherapy method according to claim 3 wherein the photon beam contains photons having energies of less than 400 keV which are absorbed by the contrast medium in the treatment volume.

5. A radiotherapy method according to claim 3 comprising producing the photon beam in a linear accelerator.

6. A radiotherapy method according to claim 5 wherein the linear accelerator comprises a target, the photon beam originates at the target and the photon beam encounters no flattening filter between the target and the treatment volume.

7. A radiotherapy method according to claim 6 comprising operating the linear accelerator at a voltage not exceeding 4MV.

8. A radiotherapy method according to claim 6 comprising operating the linear accelerator at a voltage not exceeding 2.2MV.

9. A radiotherapy method according to claim 6 comprising operating the linear accelerator at a voltage in the range of 1 MV to 4.5 MV.

10. A radiotherapy method according to claim 3 wherein the photon beam has a diameter not exceeding 60mm.

11. A radiotherapy method according to claim 10 wherein the photon beam has an intensity which is uniform to within 5%.

12. A radiotherapy method according to claim 3 wherein the contrast medium contains iodine.

13. A radiotherapy method according to claim 3 wherein the contrast medium contains lutetium.

14. A radiotherapy method according to claim 3 wherein the contrast medium contains gadolinium.

15. A radiotherapy method according to claim 3 wherein the contrast medium contains gold.

16. A radiotherapy method according to claim 3 wherein the treatment volume is intracranial.

17. A radiotherapy method according to claim 3 comprising delivering the contrast medium into the treatment volume by way of a catheter extending into the treatment volume.

18. A radiotherapy method according to claim 3 wherein the treatment volume contains tumor tissue.

19. Use of a linear accelerator operating at a voltage in the range of 1 MV to 4.5 MV to generate a photon beam having an energy spectrum characterized by a maximum photon energy in excess of 1 MeV, a mean photon energy in excess of 250 keV, and a maximum fluence at an energy in excess of 100 keV for irradiation of a treatment volume within a subject and containing a high atomic number contrast medium.

20. A linear accelerator for use in radiotherapy, the linear accelerator comprising:

an electron accelerator;

a target disposed to receive a beam of electrons from the electron accelerator to generate a photon beam;

one or more flattening filters selectively insertable into a path of the photon beam;

a controller;

an interlock mechanism connected to signal to the controller when one of the one or more flattening filters is in the photon beam and when none of the one or more flattening filters is in the photon beam;

the linear accelerator having a first operating mode into which the controller can place the linear accelerator when the interlock mechanism indicates that the flattening filter is in the path of the photon beam and a second operating mode into which the controller can place the linear accelerator when the interlock mechanism indicates that one of the one or more flattening filters is in the path of the photon beam;

wherein, when the linear accelerator is in the first operating mode, the controller causes the electron beam to be operated at a reduced voltage in the range of 1 MV to 4 MV to produce the photon beam having an energy spectrum characterized by a maximum photon energy in excess of 1 MeV and a mean photon energy in excess of 250 keV and when the linear accelerator is in the second operating mode the controller causes the electron beam to be operated at a voltage in excess of the reduced voltage.